

Country Gap Report

Uganda

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© Olga Svetlana Munoz Pogoreltseva, and Advancing women's participation in livestock vaccine value chains in Nepal, Senegal and Uganda 2019

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Abbreviations

BMGF	Bill & Melinda Gates Foundation
CAHW	Community animal health worker
CBPP	Contagious bovine pleuropneumonia
DVO	District veterinary officer
ECF	East Coast fever
FAO	Food and Agriculture Organization of the United Nations
FMD	Foot-and-mouth disease
FEWS NET	Famine Early Warning Systems Network
GAC	Global Affairs Canada
GDP	Gross Domestic Product
GITA	Gendered Intersectional Transformative Approach
IDRC	International Development Research Centre
LIPW	Labor-intensive public works
LVIF	Livestock Vaccine Innovation Fund
LVVC	Livestock vaccine value chain
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MPED	Ministry of Finance Planning and Economic Development
NAD	National Drug Administration
NDP	National Development Plan
NGO	Non-governmental organization
OIE	World Organization for Animal Health (Office International des Epizooties, OIE)
PPR	Pestes des petit ruminants
TLU	Tropical Livestock Units
UF	University of Florida
USAID	United States Agency for International Development
UWEP	Uganda Women Entrepreneurship Programme
VVC	Vaccine value chain

Introduction

University of Florida (UF) in partnership with the Canadian International Development Research Institute (IDRC) is implementing a three-year project called *Advancing Women's Participation in the Livestock Vaccine Value Chain in Nepal, Senegal and Uganda*. The goal of the project is to understand women's roles and participation in the selected poultry and small ruminant value chains by evaluating issues of intersectionality on women's involvement in the livestock vaccine value chains (LVVCs) and providing capacity development to community animal health workers (CAHWs) to increase female livestock keepers' participation in LVVCs. The primary objectives of this project include:

- O1: Designing a gender and intersectional mapping tool for small ruminant and poultry vaccine value chains, and testing it in Nepal, Senegal, and Uganda.
- O2: Evaluating the impacts of gender, intersectionality and other site/country specific characteristics (socio-economic, technical, political) on women's entry and effective participation in and benefits from the LVVC.
- O3: Removing barriers for women's entry and participation in the LVVC by applying GITA through various modes of training and innovative interventions that will lead to their inclusive participation in LVVC.

The project is divided into three stages in all three countries. This report focuses on Uganda. The purpose of the first stage is to map the LVVC, particularly, the one for pestes des petit ruminants (PPR) vaccine in the Karamoja sub-region in Uganda. The primary focus is to determine how the current PPR vaccine value chain (VVC) functions in terms of delivering vaccines to or involving female livestock keepers in the vaccine distribution value chain, as well as the related attitudes and perceptions of various LVVC actors on women's involvement in the LVVC. Additionally, the mapping is designed to capture how gender intersects with other identities of the women such as ethnicity, age, socioeconomic position, education, religion, livelihood, etc. The second stage will focus on designing a gendered intersectional transformative training program for CAHWs to help them engage or better serve the female livestock keepers. The third stage will focus on systematic review and metanalysis of findings from stages 1 and 2 of project activities to identify the main levers and barriers at each node of the LVVC and develop an analytical framework to assess factors underlying women's limited engagement in the LVVC and strategies to overcome the barriers.

This country report serves as a background to launching value chain mapping of the PPR vaccine in the Karamoja sub-region.

Country profile

Socio-economic and political context

Uganda is a landlocked country located in East Africa, bordered by Kenya in the east; South Sudan in the north; Democratic Republic of Congo in the west; Tanzania in the south; and Rwanda in the south west (Uganda Bureau of Statistics, 2016) and it has about 40.9 million inhabitants (Central Intelligence Agency (CIA), 2018). It is one of the fastest growing countries in the world, with a fertility rate of 5.8 children per woman and a growth rate of 3%. Further, 78% of its population is below the age of 30, whereas 37% is below the age of 9 (CIA, 2018; United States Agency for International Development (USAID), 2019). Uganda has the largest refugee population in Africa (around 1.35 million), making it the third worldwide (World Bank (WB), 2018).

Uganda gained independence from Great Britain in 1962. This was followed by years of turmoil that included friction with the Buganda kingdom, the abolishment of the traditional kingdoms, a military coup and a last coup in 1986. Since 1986, the country has been led by president Yoweri Museveni of the National Resistance

Movement (CIA, 2018). The country is divided into districts and one City. The districts are further subdivided into counties, sub counties and parishes (Uganda Bureau of Statistics, 2016).

English is the official language and Swahili is being promoted in the spirit of regional integration within the East African Community. The largest ethnic group is the Baganda (17.7%), followed by the Banyankole (10%). The remaining population belong to one of the other over 50 ethnicities present in the country (Uganda Bureau of Statistics, 2016). The 2014 census found that the largest religious categories are Catholics (40%), followed by Anglicans (32%), and Muslims (14%), which together represent more than 80% of the total population (Uganda Bureau of Statistics, 2016).

Uganda is classified as a low income country with a Gross Domestic Product (GDP) per capita of \$2,400 and a Human Development Index of 0.516, ranking 162nd out of 189 countries, (United Nations Development Programme (UNDP), 2018). It is among the 20 countries with the highest prevalence of undernutrition. Average annual growth of GDP between 2011 and 2016 was 4.5%, lower than in previous years, probably related to adverse weather conditions, unrest in South Sudan and the Democratic Republic of Congo (undermining exports), private sector credit constraints, and the poor execution of public projects. Nonetheless, the growth rate is rebounding, driven mainly by the growth of information and communication technology sector and appropriate weather conditions for agriculture (WB, 2018).

The economy is guided by the National Development Plan (NDP). Currently, Uganda is implementing its second NDP (NDP II), aiming at moving the country towards middle income status by 2020, the second in a series of 6 five-year plans to achieve the Uganda 2040 vision (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), 2019c). The NDP II also seeks to leverage international and regional frameworks such as the Africa Agenda 2063 (Uganda Bureau of Statistics, 2016).

In the last two decades, Uganda has introduced structural reforms, especially in the public sector, and investments that have reduced poverty (it has already attained the millennium development goal of halving poverty; nonetheless, these improvements are feeble, as for every three Ugandans who come out of poverty, two fall back), gender inequality and hunger, and improved public sector management and institutional quality. Social services have also expanded, particularly in education and health as a result of the government's policy of universal access (WB, 2018; Uganda Bureau of Statistics, 2016). Nonetheless, limited accountability, corruption, poor economic management, heavy reliance on outside donors for long-term development of agriculture, education and health, and infrastructure projects depending on concessional loans with high inflation rates still remain (CIA, 2018; WB, 2018).

Agriculture is Uganda's backbone (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), 2019a). According to the 2014 national census, nearly 64% of the working population is engaged in subsistence agriculture and 80% of households is involved in agriculture. Professionals and technicians account only for around 3% of the working population (Uganda Bureau of Statistics, 2016). Agriculture also produces around 24% of the GDP. Uganda produces 72% of the region's staple food commodity exports and nearly 50% of the total export earnings are agricultural, with coffee, tobacco, and fish being the main products (MAAIF, 2019a; Uganda Bureau of Statistics, 2016).

The government of Uganda introduced universal primary education, that covers up to four children per family, and universal secondary education programs in 1997 and 2007 respectively; the NDP II emphasizes education as an aspect of human capital development. Nonetheless, during the 2014 census, it was found that about 1 in every 10 children of primary school age had never been to school and 22% of secondary school aged (13-18) children had already left school. The percentage of women/girls who had not completed any level of education was higher than men/boys (29 versus 18 %). The percentage of women/girls and men/boys over the age of six who had completed primary education was similar (59 and 64%, respectively),

while the share of women/girls who had completed a level above this was lower than the share of men/boys (22 vs 32%). Furthermore, literacy among women is lower than for males (68 vs 77%) (Uganda Bureau of Statistics, 2016). Uganda ranks 126th (out of 189 countries) according to the Gender Inequality Index, with a value of 0.523; 162nd (out of 189 countries) according to the Gender Development Index, with a value of 0.865 (UNDP, 2018), and according to the National Planning Authority, there is systemic gender discrimination at all levels. According to the Organization for Economic Co-operation and Development's Social Institutions and Gender Index, Uganda ranks 73rd out of 102 countries (Food and Agriculture Organization of the United Nations (FAO), 2017).

National agencies are bound to promote gender balance and fair representation of marginalized groups by Uganda's constitution. In 2007, the government introduced the Gender Equality Policy with the Ministry of Gender, Labour and Social Development being in charge for its implementation. Furthermore, every government agency has its own gender strategy and a gender focal point. The Ministry of Finance, Planning and Economic Development (MFPED), guided by an Equal Opportunities Commission, evaluates gender inclusion in different sector plans and budgets. This ministry also has a gender unit specialized in gender budgeting. The government has also trained and promoted awareness among local level government officials to enhance their capacity of gender mainstreaming since 1997. With respect to agriculture, district level governments generate sector plans and budgets, which are synthesized at the central level and submitted to the MFPED for financing, after they are evaluated for their level of gender mainstreaming (FAO, 2017).

Uganda has ratified the Convention on the Elimination of all forms of Discrimination Against Women and at the regional level the African Charter on the Rights of Women in Africa. Nonetheless, this gender driven legislation coexists with several discriminatory laws, policies and cultural practices. This stems from a lack or delay in the passing of bills and laws that can complete and/or reinforce constitutional articles, weak enforcement of laws, the difficulties in operationalizing government policies in the different sectors, and the discordance between the constitution articles and/or customary laws and/or societal practices and norms (Ssali, 2019). Further the richness of ethnicities and religions in Uganda renders the translation and adaptation of the progressive legislation complicated (Organization for Economic Cooperation and Development (OECD), 2019). Women face discriminatory family code and ownership of assets, such as land, exacerbated with limited access to technologies, knowledge, information and other extension services, including financial opportunities, such as credit and insurance. Women own only around 4% of rural land and 65% of female farmers do not control their farm profit (FAO, 2017; 2018a). Examples of discordance can be found in many arenas. For example, the 1973 Customary Marriage Act sets 16 as the age for marriage consent for men and women, while the constitution sets 21 as the legal age. In rural areas, neither of these dictamens are followed, and arranged marriages of minors still take place (OECD, 2019). In a further example, customary laws oppose women controlling and owning of land, and ban the transfer of land ownership to women, even if these contradict the Land Act of 1998 with its subsequent amendments. According to the 1972 Succession Act, a woman has the right to inherit from her husband, which is in direct contradiction with customary law's dictamen of women and girls being unable to inherit (OECD, 2019). Social practices and norms also hinder the application of the gender-based governmental framework. For example, they discourage women from growing cash crops, and from participating in markets (FAO, 2017). There are no legal obstacles for women to access financial products, but many financial institutions require women to evidence spousal consent to be allowed to open a personal bank account (OECD, 2019). Gender-based violence continues to represent a threat with prevalence of sexual harassment during negotiations (FAO, 2017; 2018a). There are usually differences between urban and rural environments, with the latter holding more traditional views, which are usually more discriminatory in nature. Another obstacle is the lack of gender disaggregated data to guide gender-focused programming. Albeit, progress has been seen in the public space. For example, in the 9th Parliament, 34.2% of the members were women due in large part to the quotas established for women and other minorities/underrepresented groups, e.g., disabled and youth (FAO, 2018a).

In the agricultural sector, 77% of the labor force are women (MAAIF, 2019a). More women than men are involved in crop production, while the opposite is true for livestock production (65% of those involved in livestock production are men). Gender issues were recognized and included in the Agriculture Sector Development Strategy and Investment Plan of 2010/11-2014/15 (MAAIF, 2010).

Farmers in Uganda are affected by several constraints related to the lack of access to technologies, information, business skills, finance, migration and climate change. Nonetheless, these factors affect women in a different and more severe manner than men. For example, more women still use rudimentary technologies for farming. This is also compounded by a heavier workload in the household. This workload has been further increased by a higher rate of men and male youth migrating to urban settlements, leaving women and the elderly to carry out the work, which has led to decreased productivity. Women also have a lower participation rate in markets, and those that participate sell products at lower prices, which is caused by women's lower exposure to market information. This is further exacerbated by a lack of business skills (which is true both for men and women) that also impedes a sustainable production for markets and value addition to their products (FAO, 2018a). Climate change affects women differently. For instance, during drought periods, men pastoralists need to travel longer distances in search of water and pastures, while women travel these distances in search of household water. Climate change is also forcing male and youth population to abandon agriculture and migrate to big cities. Another constraint affecting women differently is access to agricultural credit. Women do not always have collateral, which is related to their obstacles in owning land or livestock and often receive only partial information about government programs on agriculture finance due to their spouses restricting their mobility (OECD, 2019; FAO, 2018a).

The National Gender Profile of Agriculture and Rural Livelihoods, developed by FAO (2018a) identified the following factors as drivers of the country's gender gap:

- Women carry a larger burden in child-care and household responsibilities.
- Women farmers receive limited extension services and technical information compared to men (14% women vs. 30% men).
- Women have less access to hired farm labor and they are less efficient in using it.
- Women are particularly disadvantaged by the distance to major roads (restricting mobility or market access).
- Women complete on average fewer years of schooling
- Extension services lack women involvement and thus, are inattentive to women's needs.
- Women have limited control of agriculture income but are primarily responsible for providing food for the household.
- Most female subsistence farmers lack business skills.
- In pastoralist communities, there is limited livestock production by women mainly due to women's heavy workload, limited capital and traditional beliefs. This affects their income levels.
- Women have less access to agricultural credit.

Livestock systems

In the 2014 census, 58% of households were involved in livestock farming (Uganda Bureau of Statistics, 2016). Livestock represents 4.2% of the GDP, 1.5% of the exports and around 17% of agricultural GDP (MAAIF, 2019a; The Intergovernmental Authority on Development Center for Pastoral Areas & Livestock Development, 2013). Agriculture is seen as a fundamental piece for achieving the NDP II and production targets for main livestock products, that is, beef, pork, mutton, goat, and poultry, have been set for 2020. The strategy includes the undertaking and improvement of control of vectors and diseases through vaccinations, disease surveillance and construction of infrastructure for disease control; pasture development; construction of valley dams for provision of adequate water for livestock production; supply of high genetic materials; technological promotion; and, creating a buffer stock/animal handling grounds to support beef processing

(MAAIF, 2019a). The last national livestock census conducted in 2008, estimated the number of cattle at 11.4 million, sheep at 3.4 million, goats at 8.5 million, pigs at 3.2 million and poultry at 27.5 million (Uganda Bureau of Statistics, 2009).

Cattle is the most important source of meat and the most important livestock from an economic perspective. Most livestock are found in the “cattle corridor”, an area extending from south-western to north-eastern Uganda. Most cattle farmers are smallholders primarily producing milk, most of which is destined for household consumption, and to a small degree meat. Cattle are reared under commercial ranching (mostly in the South-western and Central-1 and 2- regions), pastoral, agro-pastoral (mainly present in the East-central, Mid-western, Mid-eastern, Mid-northern and West Nile regions) or semi-intensive systems (mainly found in the Central and in the South Western sub-regions, and in peri-urban areas). The most common farming systems are pastoral and mixed smallholder farms, accounting for the ownership of around 90% of cattle and 100% of the other main livestock species (goats, sheep, pigs, and rabbits). Pastoral systems are dominant in the North Eastern sub-region (Kotido, Moroto, Soroti, and Kumi districts), in the South West sub-region (Ntungamo, Mbarara, Masaka, Sembabule, and Rakai districts), and in Central Uganda (Luwero and Kiboga districts).

Chicken are reared under free-range, semi-intensive (mainly found in peri-urban areas) or intensive systems, but they are mainly kept for subsistence. It is estimated that about 50% of the population keeps scavenging poultry (FAO, 2018b).

Relative to flock sizes, the annual meat production from goats is small. Nonetheless, they significantly contribute to the net cash profits in agro-pastoral systems. Almost all (95%) goats are indigenous breeds and most of them are kept by smallholders, mainly represented by the rural poor and vulnerable women-headed households (Semakula, Mutelikka, Kugonza, & Mpairwe, 2010). Further, goats also serve as savings and investment, providing safety nets during crop failures, and play a cultural role related to marriage as dowry, as sacrifice animals, and in-kind payments when cultural norms and taboos are violated (Kugonza, Nabasirye, Hanotte, Mpairwe, & Okeyo, 2012). It is estimated that 90% of small ruminants are owned by pastoralists (FAO, 2018a).

Animal health and veterinary services

The Ministry of Agriculture, Animal Industry and Fisheries is the government agency in charge of animal health. The Ministry houses four Directorates: Animal Resources, Crop Resources, Fisheries Resources, and Agricultural Extension Services. The Directorate of Animal Resources is formed by three Departments: Animal Production, Animal Health, and Entomology (MAAIF, 2019). The Department of Animal Health is headed by a Commissioner and has the following three divisions, each headed by an Assistant Commissioner: Animal Disease Control, Veterinary Diagnostics and Epidemiology, and Veterinary Regulation and Enforcement. The Ministry also houses seven agencies, among which the following related to livestock, the Dairy Development Authority, the National Agriculture Advisory Services, the National Agricultural Research Organisation, and the National Animal Genetic Resources Centre and Data Bank (MAAIF, 2019b).

The decade that followed independence in 1962 was marked by efficient and widespread public veterinary services. Subsequently, economic, social and organizational constraints diminished its efficiency through time, until in 1987 the government undertook economic and structural reforms, including the privatization of the veterinary services and the liberalization of veterinary drug and vaccine imports and distribution (enacted by the National Drug Policy and Authority Statute Act in 1997). This was also coupled with decentralization, and public veterinary services were devolved centrally from the MAAIF to District Veterinary Offices (DVOs), who now fully hold the responsibility for disease control, while MAAIF retains responsibility for formulating policy, providing technical guidance, and supporting disease control.

Cattle is affected by different diseases according to the production system. Cattle reared in a pastoralist production system are frequently affected by contagious bovine pleuropneumonia (CBPP), brucellosis, and tick-borne diseases, and high prevalence of tuberculin reactions (i.e., a possible high prevalence of tuberculosis) have been registered in the Karamoja sub-region. Pastoralists have low access to animal health services, including vaccinations, which usually are obtainable only through government campaigns. Agro-pastoralists invest more than pastoralists in the health of the animals, but still have limited resources. Common diseases in this system are East Coast fever (ECF), anaplasmosis, tick infestations, trypanosomiasis, foot-and-mouth disease (FMD), CBPP, and brucellosis. The diseases for which animals are vaccinated most frequently are FMD and CBPP. Commercial farmers have more possibilities and invest more in the health of their animals. However, diseases such as anthrax, bovine tuberculosis, brucellosis, FMD, rabies, CBPP, lumpy skin disease, and infestation with helminths are common. The prevalence and incidence of diseases in intensive systems is low, thanks to the investment in disease prevention and treatment (FAO, 2018b).

As for cattle, the diseases found in poultry depend on production systems, given its correlation with the economic, time, and knowledge investment capacity on prevention and treatment of diseases. Chickens in the semi-intensive production system are often affected by Newcastle disease, Gumboro, Marek's, fowlpox, avian influenza, and salmonellosis. Chickens in intensive systems are vaccinated against several diseases, such as Newcastle and Gumboro (FAO, 2018b). Regarding swine, pig farmers regard African Swine Fever as the most important disease, followed by gastrointestinal worms (predominantly strongyles followed by *Coccidia*), and sarcoptic mange mites (Dione, Steinaa, Okoth, Roesel, & Wieland, 2016).

Literature review

Peste des petits ruminants vaccine value chain in the Karamoja sub-region

The Karamoja sub-region, with a population of 1.3 million is located in the north-east of the country. It is subdivided into nine districts: Kaabong, Kotido, Abim, Moroto, Napak, Amudat, Nabilatuk, Karenga, and Nakapiripirit. This region is classified as one of the world's poorest areas with an estimated 82% of the population living in poverty (The Intergovernmental Authority on Development, 2015). The Uganda National Household Survey in 2016-17 found that 61% of the population is income poor, compared to 27% in the rest of the country (Uganda Bureau of Statistics, 2017). Karamoja is less economically developed due to long-term conflicts, internal violence (cattle-rustling raids or looting livestock still take place, although less frequently than in the past), periodic natural disasters (CIA, 2018), and erratic climatic conditions (especially rain) with a land more conducive for livestock grazing than crop culture (Famine Early Warning Systems Network (FEWS NET), 2016). Women often have the most to lose from conflicts or get trapped in the perpetual cycle of poverty. Insecurity also exacerbates women's freedom of movement which results in reduced access to livestock inputs, including vaccines, food, water, and interrupts education.

The sub-region is populated mostly by the Karamojong, followed by the Pokot, both nomadic pastoralist ethnicities that live in the plains, and three tribes (Nyangeya, Iik, and Tepeth) that live mainly in the mountains and hills with a sedentary lifestyle (Longoli, n.d.). The following ethnic groups belong to the Karamojong: Matheniko, Bokora, Pian, Jie, Tobur (sometimes called the Acholi Labwor), Dodoth, and Napore. The Tepeth, Iik (sometimes called the Teuso, but not to be confused with the Teso of the Teso region), and Nyangeya are also considered Karamojong (Ssenkaaba, 2015). It is important to note that for most of these populations, wealth is based on cattle ownership, which has drastically decreased, from ca. 2.7 Tropical Livestock Units (TLU) per person in 1959 to 1.3 in 2002 (Crawford and Kasiko, 2016; Mercy Corps, 2018). In addition, 56.5% of households fall below the 3.3 TLU/capita, the threshold that defines a livestock poor household and the minimum needed to sustain an agropastoral livelihood (Ayele & Catley, 2019).

This is the region with the highest proportion of population with no formal education in the country (45.3% of men and 58.1% of women, 51% of the population aged 6-24 years, compared to a range of 1 to 8% in

other sub-regions (Crawford & Kasiko, 2016; Uganda Bureau of Statistics, 2017). According to development agencies and government officials, the Karamojong and the Pokot underinvest in formal education, especially for girls (Crawford & Kasiko, 2016). Around 40% of girls and 54% of boys attend primary school, with numbers dropping to around 7% in both cases for secondary school attendance. Only 5.5% of women between the ages of 15 to 49 are literate (able to read one complete sentence) versus 18.5% of men (Crawford & Kasiko, 2016). Formal education is mostly seen as a safety net and diversification strategy in case of failure of traditional livestock keeping, as well as a source of food for children. Nomadic style of living, coupled with the burden of household chores, specific cultural and societal roles for boys and girls, and lack of inclusion of types of knowledge that are important to them, are among the factors related to a low uptake of formal education (Ssenkaaba, 2015).

From a livelihood perspective, this area can be classified into three agro-ecological zones (FEWS NET, 2016).

1. Pastoral (stripe of land on the east): semi-arid zone where the main livelihood is based on raising cattle, goats and sheep, and crop production depending on rainfall.
2. Agropastoral (stripe of land in the center): an area that receives more rainfall with an erratic distribution and sustains crops, such as sorghum and millet. Livestock focuses on steers, bulls, sheep and goats connected to transhumant herds.
3. Agricultural (small areas of land in the south, and west): a more fertile zone, referred to as the “green belt”, which supports a wide variety of crops, including cash and food crops and a variety of vegetables and fruits, apart from livestock.

Karamoja contributes 20% of the total national cattle population, 16% of goats, 60% of horses, 97% of camels, 91% of donkeys, and 49% of sheep (Uganda Bureau of Statistics, 2009). According to the livestock census conducted in 2008, there were 2,253,960 cattle, 2,025,293 goats, and 1,685,502 sheep (Uganda Bureau of Statistics, 2009). More recent estimates based on district data report much lower numbers (711,137 cattle, 821,041 goats, and 842,157 sheep) (Abebe, 2016). There is an agreement on the fact that flock and herd sizes have decreased, but exact numbers are to be interpreted with caution, as these numbers are derived from questionnaires. Pastoralists and agro-pastoralists consider the number of livestock they own a private matter and are unwilling to share this information, which is compounded by mistrust in the government in this area. Further, answers might be tailored to the respondent, due to various aid programs run by the government and/or non-governmental organizations (NGOs) in the past years (Aklilu, 2016). In Uganda, 90% of livestock contribution to the GDP comes from rangelands. Most (80%) of Karamojong are pastoralist or agro-pastoralist depending on ruminants, with most being grazed on rangelands. Traditionally, pastoralists, specifically, boys and men with few girls, travel during the dry season, which goes from September to April, to find water and grass, while women, elders, young children and girls stay in semi-permanent villages (manyattas) with a few milking animals, along with weak and sick animals (Dyer, Omondi, & Wantsusi, 2008). There has been a decline in this practice due to land use changes and governmental policies. The government has been working for decades to change this practice and increase sedentarism. This attempt brought armed conflict, followed by a disarmament process that ended in 2010. The government is still promoting the end of subsistence-based pastoralism and sedentarism, along with rearing of exotic breeds to increase milk and meat production, and settlements based on crop production, with the goal of industrializing, modernizing and commercializing livestock production. The decrease in mobility, climate change, and land use changes (e.g. due to mining and land grabs), have caused a shortage of pastures, overgrazing, increase in livestock diseases, and a decrease in reproduction rates. The decline in resources brings conflicts between the communities, further complicated by migration of other pastoralist communities, such as the Toposa from South Sudan and the Turkana from Kenya into Karamoja during the dry season (Muhareza, 2019; Obin, 2019; USAID, 2017).

In the Karamoja sub-region, the public and private sector have been unable to provide adequate veterinary services. The private sector developed mostly in Kampala and other large cities, while remote areas, such as Karamoja, were not seen as a profitable terrain. The private sector associated these areas with lack of infrastructure, high mobility production systems, limited local cash economy, and a heavy reliance by pastoralists on traditional means of disease control and prevention. Furthermore, Karamoja's socio-political instability has made it even less attractive to the private eyes. This gap has been partially filled by CAHWs. The first CAHWs in Karamoja were trained in the early 1990s by the government. Some projects supported CAHWs with starter kits of drugs (e.g., training conducted by FAO) and with the establishment of drug shops owned and managed by CAHW associations (FAO, 2013). The formal veterinary profession in Uganda rejected and criticized CAHWs and NGOs, notwithstanding their decisive role in remote and impoverished areas. Through the years, dialogue has eased this friction, but CAHWs are still not recognized in the Veterinary Surgeon's Act and the National Drug Statute implies that CAHWs are tolerated but not legal (Abebe, 2016).

According to Bugeza *et al.* (2017), livestock keepers are satisfied with CAHWs performance and they find that they are the most readily accessible animal health services, even if there is room for improvement. Nonetheless, Abebe (2016) found that there are concerns regarding CAHWs' lack of motivation and technical competence, the latter probably stemming from a mismatch between their literacy level and the type of training provided. Similar findings were evidenced by a PPR site assessment conducted between 2017 and 2018 (Coffin-Schmitt, 2018).

The main players involved in animal health and veterinary service delivery in Karamoja are the government:

- DVOs at the local level;
- The MAAIF, the National Drug Administration (NDA), and research and academic institutions such as the National Agricultural Research Organization and the College of Veterinary Medicine, Animal Resources and Bio-security at Makerere University at the central level;
- NGOs, around 14 working with livestock; and,
- Private sector actors, including private veterinary pharmacies owned or supervised by veterinarians, drug shops owned and managed by animal health assistants or technicians, CAHW associations or cooperatives (there are around 31), CAHWs, traditional healers; and "backpack" or mobile drug traders who sell drugs in livestock markets), including the livestock owners themselves.

There are few government veterinary staff in Karamoja and most of the trainings happening in the sub-region involves CAHWs (Abebe, 2016). According to FAO, there are eight veterinary doctors and seven paravets employed by the government, and FAO has trained 600 CAHWs (FAO, 2013). Overall, all service providers and livestock keepers are not satisfied with the volume and quality of vaccines and medicine available in Karamoja. The most important barriers drug shops face are low financial capital and high transport costs (Abebe, 2016).

There is no data readily available in Karamoja for vaccination coverage and it is difficult to assess the veterinary service coverage. Vaccinations are applied in response to outbreaks, instead of being part of preventive measures (Abebe, 2016). Therefore, important transboundary diseases, such as FMD, CBPP, and PPR, even if subjected to vaccination campaigns, still have significant negative impact in the area. A study undertaken at four sites in the sub-region aiming at evaluating vaccine coverage using changes in disease impact as a proxy, evidenced the following diseases as having high impacts, thus, implying a gap in the effectiveness of veterinary services: in cattle, trypanosomiasis, tick infestation and its related diseases, especially babesiosis, anaplasmosis and ECF; in small ruminants, PPR, tick infestation and its related diseases, especially heartwater, and sarcoptic mange. The results are consistent with community perceptions (Abebe, 2016).

PPR in the region

The World Organization for Animal Health (OIE) lists PPR as a notifiable disease, given its economic importance at the national level correlated to mortality and morbidity, and in terms of international trade because of the risks of spread between countries and regions (FAO & OIE, 2015). OIE and FAO have developed a global strategy for the control and eradication of PPR by 2030. This strategy includes nine regional roadmaps, among which the Eastern Africa roadmap. It has three integrated components: PPR control and eradication; strengthening veterinary services; and, prevention and control of other major diseases of small ruminants (FAO & OIE, 2015). There are several vaccines available for the control of this disease, including thermostable ones (Mariner, Gachanja, Tindih, & Toye, 2017). These vaccines are good but it would be valuable to have vaccines that allow to distinguish vaccinated from naturally infected animals, so called DIVA (IDRC, 2019)¹.

The first suspected outbreak of PPR in the Karamoja sub-region took place in 2006 and the MAAIF confirmed the presence of this disease in 2007, which led to a vaccination campaign, that has continued ever since. Nonetheless, outbreaks are still common. In fact, PPR is considered the disease with the highest impact on small ruminants in Karamoja (Abebe, 2016). A study in 2011 evidenced a prevalence of PPR in goats ranging from 1.6 to 85.2% (Mulindwa et al., 2011). Uganda does not currently have a national PPR vaccination strategy and vaccinations in Karamoja happen ad hoc, reaching on average 55.3% herd immunity. According to other studies, the real coverage is probably around 15-20% (Nkamwesiga et al., 2019), while the control of spread of PPR requires between 70 to 80% of herd immunity. Low herd immunity could be related not only to low coverage, but also to the quality of the vaccine and/or its administration. For example, in 2016, the NDA found the vaccine distributed in Karamoja was of substandard quality and recalled it. Interviews with livestock keepers, CAHWs, drug shop owners, and government veterinarians, evidenced the presence of poor-quality or counterfeit drugs, relating them to being close to the Uganda-Kenya border as well as related lack of control by NDA (Abebe, 2016).

The NDA has a good system in place for the assurance of the quality of veterinary products during importation, as well as for regulating premises and facilities that deal with importation, distribution, and sale of the products. Nonetheless, it is not clear the degree of quality control of the products once they are in the market. The NDA has a national pharmaceutical quality control laboratory; which capacity remains to be examined. Further, several conditions predispose Karamoja to the circulation of counterfeit drugs, such as, poor access to quality medicine in remote areas, limited supply due to a mismatch between financial interests of retailers in Kampala and financial capacities of shops in Karamoja (retailers are willing to sell only for higher amounts than what the shops can afford), and lack of enforcement of quality assurance regulations. Regarding vaccines, DVOs complain that they do not receive adequate quantities and that they do not receive them on time. In fact, Uganda highly depends on FAO and to a lesser extent on NGOs for vaccine supply and support of vaccination services (Abebe, 2016; Ilukor, Birner, Rwamigisa, & Nantima, 2012).

Regarding vaccination administration, studies have evidenced that CAHWs are effective when it comes to vaccinating (Abebe, 2016). Nonetheless, there is an overall lack of coordination between the different actors and involvement in different activities (e.g., government and NGOs training of CAHWs without the involvement of private veterinarians has created mistrust and competition). Also, veterinarian corruption has been noted in this area, with veterinarians keeping funds for themselves that are aimed at paying CAHWs during vaccination campaigns (Ilukor et al., 2012).

¹ DIVA vaccines are important tools during control and eradication efforts of livestock diseases, as they allow to determine if an animal is positive to a diagnostic test because of previous infection or because of vaccination. The conclusion of these analyses have consequences on decisions of animal movement and/or other control measures, such as culling.

A collaborative project by the University of Florida, Tufts, Makerere University, and Mercy Corps in Karamoja is aimed to evaluate approaches for controlling PPR using a thermostable vaccine and to build capacity for vaccine distribution (Feed the Future Innovation Lab for Livestock Systems, 2019). By using participatory epidemiology and serological and molecular tests, the project identified disease transmission hotspots to develop a targeted vaccine strategy. These spots are in two areas, one in the north and one in the south, linked with transmission in Kenya. These represent separate systems and should be targeted ad hoc, including their transboundary nature (Nkamwesiga et al., 2019).

Gender dynamics and women's role in the livestock sector

In the Karamoja sub-region, traditionally men are polygamous, own and oversee livestock and finances, and are in charge of making decisions, with little to no input from women. Women serve a primary reproductive role and are responsible of domestic work, including the provision of food for the household, childcare, fetching water, collecting firewood, building and fixing houses. They are also responsible for cultivating and maintaining backyard gardens (Williamson, 2016). Women carry all of the workload for maintaining the households and communities (Crawford & Kasiko, 2016). In some areas, women can have more control over income deriving from crops, chickens, ducks, their labor, and small business activities, such as brewing (Stites, 2019). Women also participate in the treatment of animals, by acquiring drugs and interacting with CAHWs. However, they have a limited capacity to pay for these services (Akello, Aduto, & Narrebah, 2013). These roles are reinforced by social norms and peer pressure (Williamson, 2016). Nonetheless, changing dynamics, including the diminishing herd and flock sizes, has diversified the livelihoods to include also non-livestock areas, where women have a more prominent role, and are also moving men away from their traditional roles in livestock keeping. The number of women who are actively selling animals in markets is increasing, as well as the number of men involved in crops (Akello et al., 2013; Stites, 2019). According to some studies, the changing dynamics, primarily, a decreasing traditional role of men and losing status of being a main provider for the household, has increased gender-based violence, which is already endemic in the region (Crawford & Kasiko, 2016; Stites, 2019; The Intergovernmental Authority on Development, 2015). In addition, a decrease of a cultural framework and traditions overall, has increased alcohol consumption and abuse (Crawford & Kasiko, 2016; The Intergovernmental Authority on Development, 2015). A strong dependency on outsiders' aid is also eroding the community's sense of self-worth, social and cultural capital, meaning and purpose (Crawford & Kasiko, 2016).

A study conducted among Pokot pastoralists communities, identified that children are usually the herdsmen and the first to notice when animals are sick. Children then notify their mothers, who commonly respond first to treat animals with traditional medicine. If the animals do not improve, the male head of the household is informed. Therefore, Pokot women's role in animals' welfare is fundamental. Women are also frequently involved in milking, hence, can closely and frequently observe animals. Further, the Pokot polygamous nature entails that animals are divided among women and each woman has her own stock to provide food for her children. Men are mostly in charge of mobilizing resources (Ilukor et al., 2012). Similar dynamics have been described among the Karamojong (Akello et al., 2013).

Intersectionality issues shaping the social norms and relations

According to the Ugandan demographic and health survey of 2011, 49% of Ugandan women aged 20–49 years were married before the age of 18 and 15% before the age of 15, mostly into polygamous marriages. Evidence suggests that these proportions are higher in the Karamoja sub-region. Child marriage, among other cultural practices, negatively affects women's access to education and their role in the economic development of the community (The Intergovernmental Authority on Development, 2015). Marital status also affects women's opportunities of livestock ownership. In a traditional household, men manage livestock, except for poultry, as stated above. Nonetheless, in certain cases, women have more control over the livestock. Many men lost their lives during the conflict years, leaving widows who have added to their traditional

responsibilities by taking on the roles of men within the households, including livestock management (Akello et al., 2013). Other women who are reported to being able to keep their animals are women in educated and emancipated households, or women who serve as CAHWs. Nonetheless, according to the study, the number of women who work as CAHWs is low (e.g., in Abim 1 female vs. 30 males, in Kotido 41 vs. 120, and in Kaabong 23 vs. 52). Women's representation in village savings and loan associations is also low compared to men (Akello et al., 2013).

Age, intersecting with gender, also determines people's roles within the community. Girls are responsible of carrying food to the kraals and milk back home or for sale, for dancing and singing at the kraal, and for helping their mothers in household chores and taking care of their siblings (Akello et al., 2013; Ssenkaaba, 2015). According to age and physical strength, men will serve different roles in livestock management and decision making. Young boys are responsible for herding animals, and in some cases for milking (Akello et al., 2013; Ssenkaaba, 2015). Elders and youthful boys are responsible for protecting the animals and the community from threats such as wild animals and raids. Young men are also involved in raids. Decision making is in the hands of an elder man. Among the Karamojong, men compose the *akiriket*, formal political, social and religious assemblies, where decisions are made collectively but where members do not have the right to speak until they are initiated (this is contingent on age and elders might wait for the men to be significantly older, ca. 30 years and above, to initiate them). The weight of the voice of initiated men will depend on the age-class they belong to. There is a similar age-class hierarchy for women, but this carries less weight regarding roles and voice, and no relationship with privileges. It usually mirrors the men's age-classes and initiation is related to marriage (Ssenkaaba, 2015).

Cattle is the main wealth representation; therefore, herd size is an indicator of status and importance in the society. Herd sizes can increase for example through marriage, as heads of cattle are given to the wife's family (Ssenkaaba, 2015).

Gender also intersects with socio-cultural traditions and practices that influence the distribution of resources and access to services between men and women. As noted earlier, the Karamojan society is divided into two main subgroups: *manyattas*, semi-permanent villages resided by men, women, children and the elderly who often rely upon family resource-sharing and communal decision-making; and *kraals*, semi-mobile livestock camps that follow grazing patterns of the group's cattle. Women in the manyatta structure have more leverage in the management of animal resources than in the kraal because of their roles. They milk cattle, take care of small livestock and poultry, seek veterinary help when needed, and grow staple crops. Literature shows that communal institutions within manyatta facilitate the more efficient resource mobilization, behavior change and access to new technologies and services. Kraals are dominated by a patriarchal system. Control of resources is in the hands of men who also control the flow of information and technology. Often remote location and constant move of kraals prevent women and men from accessing improved services, including veterinary services to combat livestock diseases (FEWS NET, 2016).

Actors in the livestock vaccine value chain

First level - MAAIF: While the acquisition and distribution of most veterinary drugs have been privatized, vaccines of public good importance remain a responsibility of the government. Livestock and animal diseases have been divided into private (e.g., all poultry diseases) and public good disease. Rabies, CCBP, FMD, CCPP, and PPR are considered diseases of public good nature. The NDA also plays a role, given its remit of regulating and controlling the quality of human and veterinary medicine entering and being used in the country. All vaccines must be certified by the African Union Pan African Veterinary Vaccine Centre and then sanctioned by the Commissioner of Animal Health. Theoretically, vaccines are available twice a year (the year is divided into 4 quarters, and vaccines are usually available during the first and last quarters).

The steps for vaccine distribution from the central government to the districts, specifically in the context of the Karamoja sub-region, include:

1. DVOs are informed of availability of vaccines.
2. Once the availability is known, to request vaccines the DVO drafts a letter for the Chief Administrative Officer (main administrative head at each district), to be sent to the Commissioner of Animal Health.
3. Vaccines are distributed to districts according to outbreak occurrence or presence.

Operational Node: Vaccines are stored at a government owned storage facility in Kampala. From Kampala, vaccines are transported to a central storage in Moroto by one of the following means:

1. A DVO transports them using cool boxes and their own vehicle.
2. The MAAIF sends them to the District Veterinary Offices using a refrigerated vehicle.
3. An NGO transports them.
4. A courier transports them by using public transportation (Acosta, 2019).

Second level - DVO: Once in Moroto, the vaccines are stored either in the Karamoja Veterinary Lab (District Lab) and/or the Cooperation and Development Lab (NGO Lab). Subsequently, they are distributed to the DVOs, who perform a coordinating and supervisory role in vaccination (Acosta, 2019), but CAHWs along with extension officers are the ones performing the vaccination (Aklilu, 2016). In the Karamoja sub-region, there are nine districts and one DVO assigned to each district, thus nine DVOs who potentially serve 43 sub-counties. CAHWs are contacted through extension officers. Governmental staff and CAHWs need to cover around 60% of the population, as this is the proportion of people that has been estimated to own livestock (Wamani, 2014). DVOs usually distribute the vaccines in the district according to disease hotspots (e.g., areas where previous/current outbreaks are reported, areas where livestock from other districts and/or countries mix). CAHWs report the outbreaks and in some districts, participatory epidemiology is used.

Operational Node: Vaccination services include the following:

1. Vaccines stored at a central storage in Moroto or NGO Lab.
2. DVOs supervise the distribution of vaccines/vaccination services among CAHWs.
3. DVOs coordinate CAHWs through CAHW associations and extension officers.

Third level – CAHWs and Extension Officers: Vaccinations are announced in places of social gathering, such as churches, and through kraal leaders and herdsman. Livestock keepers are requested to bring their animals to either government provided crushes, or to crushes built by the community close to the kraals (the latter is more common during the dry season). CAHWs usually reach the livestock keepers by foot or by bike. According to the level of financial support related to any given vaccination campaign, they might also have vehicles to reach remote vaccination sites. At this level, middlemen and drug shop owners are not influential actors, given that vaccines are provided by the government and/or NGOs and/or development agencies (Ilukor et al., 2015).

Operational Node:

1. CAHWs and extension officers organize vaccination campaigns through community leaders or herdsman.
2. PPR vaccine with limited capacity cool boxes require immediate vaccination within a limited timeframe.

Fourth level - Livestock keepers: They are required to bring their animals to the vaccination sites. According to Ilukor *et al.* (2015), male members of livestock owning families are considered more influential than CAHWs. This is probably related to the fact that they help in restraining animals and control finances in case they are asked to share some of the costs. Government or NGO provided vaccines are free to livestock keepers, and these actors pay vaccinators for their services. Therefore, livestock keepers incur no costs.

Some sub-counties have implemented cost sharing in a few occasions to evaluate its uptake. Cost sharing entails the livestock keepers covering, at least partially, the costs of the services provided, mirroring the structure followed in other areas in Uganda when vaccination campaigns for public good diseases are undertaken. While payment for treatment of diseased animals is accepted in most areas, the willingness to pay for vaccination services varies widely (Coffin-Schmitt, 2018).

Organizations in the livestock vaccine value chain

The government has several programs targeting vulnerable populations and women. Primarily:

1. *Third Northern Uganda Social Action Fund Project (NUSAF 3)*: The goal of the project is to provide effective income support to and build the resilience of poor and vulnerable households in Northern Uganda. The project comprises four components: the first component, labor-intensive public works (LIPW) and disaster risk financing provides beneficiaries from poor and vulnerable households with a seasonal transfer for multiple years in return for their participation in LIPW; the second component, livelihood investment fund supports the government's aim to extend livelihood support to poor and vulnerable households and, by doing so, increase their productive assets and incomes; the third component, strengthens transparency, accountability, and anti-corruption; the fourth component, provides safety net mechanisms and project management (WB, 2019).
2. *Uganda Women Entrepreneurship Programme (UWEP)*: aims at improving access to financial services for poor, unemployed and vulnerable women in all districts and equipping them with skills for enterprise growth, value addition and marketing of their products and services. It was launched in the 2015/16 financial year (Ministry of Gender, 2019).

The most important current projects delivered by NGOS are:

1. Farm Africa's Livestock for Livelihoods is supporting women to set up sustainable, small-scale goat-rearing enterprises that will help them generate an income and provide their families with a more nutritious diet (Farm Africa, 2019).
2. *Nnyok* (a Nga'karimojong word meaning "it is ours") run by the Catholic Relief Services and its partners in Abim, Napak and Nakapiripirit districts. The program is aimed at building resilience to shocks, enhancing livelihoods and improving food security for vulnerable families. It is funded by USAID, along with *Apolou* (meaning "growth" or "it is growing" in Nga'karimojong). Mercy Corps and partners are implementing the latter in the eastern districts of Kaabong, Kotido, Moroto and Amudat (Nanyonga, 2018).

Gap analysis identified for increasing women's engagement in and benefit from the LVVC

One important challenge for the LVVC throughout the region is the limited availability of cold chain and transport, starting from the first node. The facilities in Kampala are equipped with subpar refrigerated storage and do not have a generator. Nonetheless, in case of power outages, which are rare, the area is prioritized during reconnection. Further barriers at this node are related to the lack of a reliable and a standard way of transporting vaccines, as well as the quality of the roads, especially during the rainy season.

Ilukor *et al.*, who conducted a process net-map with governmental and community stakeholders regarding the provision of veterinary services and also asked the respondents to identify the influence that each actor has in the chain, evidenced that the most influential actor regarding the acquisition of vaccines (i.e., allocating financial resources in the annual government budget) is the MFPED (2015). Specifically, this Ministry dictates the conditions under which a budget is allocated for surveillance, prevention and control of infectious diseases. This ministry also decides the budget amount. Their approach is usually reactionary, releasing money only once an outbreak has occurred (Ilukor *et al.*, 2015). Vaccines are provided free of charge, but the

government is not always capable of providing local governments with the logistical support required for conducting vaccination campaigns and/or an adequate quantity of vaccine (Ilukor et al., 2015). In fact, the second most influential actors identified in Ilukor et al.'s study (2015), were NGOs and development partners. NGOs typically come in to provide transport, fuel, training and mobilization of CAHWs and livestock keepers. According to an animal health sector report conducted by USAID and Mercy Corps in 2013 in Abim, Kotido and Kaabong districts, OXFAM and Mercy Corps, along with FAO, facilitated annual massive livestock vaccination programs, by purchasing the vaccines and paying CAHWs (Akello et al., 2013). According to interviews at the district level, around 300,000 doses of all vaccines are available yearly for the whole country. During distribution, priority is usually given to places where diseases frequently occur, such as the Karamoja sub-region. Nonetheless, each district might get around 10,000 doses for an estimate of 300,000 head of cattle. The quantity of vaccines further decreases (e.g., from 10,000 to 7,000) during the campaign due to spillages and waste. The latter commonly occurs when vaccines are reconstituted, and the livestock keepers do not bring the animals, or they have already left not to expose animals unnecessarily to the sun and to take them for grazing when the vaccination teams delay. DVOs place the constraints of the government to provide an adequate quantity of vaccines on lack of budget and/or long bureaucratic procedures (personal interviews).

Vaccines for private and public good diseases are commercially available at the national level, but there are several obstacles for their use in this sub-region. National retailers face financial difficulties in acquiring vaccines, as international manufacturers require a minimum amount to be bought. This is mirrored at the sub-regional level, where drug shops face financial difficulties for acquiring the requested amount of vaccines from the national distributors. This is compounded by the lack of an adequate cold chain for transport and stockage. The latter factor also influences the government's objection for the sub-region to store vaccines for subsequent use. The next obstacle is represented by the varying willingness of livestock keepers to pay for vaccines for public good diseases and its related services, with most not finding this acceptable.

Currently, to become a CAHW one must fulfill the following criteria, be a resident of the community, know how to read and write, and speak the local language. In the eyes of the community one must also own animals, be reliable, sociable, and know about grazing. Usually people who were herders are favored. Therefore, if the community is to choose, men are favored for this role, while women are promoted when the government intervenes in the selection. CAHWs do not receive a monthly salary but they are paid by the livestock keepers for their services when treating animals, and, by the government, development agencies or NGOs (most frequently the latter two), when participating in vaccination campaigns. According to men CAHWs, women CAHWs face difficulties in developing a sustainable business based on providing services to the community because of the high load of household responsibilities, which prevents them from allocating a suitable amount of time to cultivate this endeavor. Hence, they usually prefer and/or can allow themselves only short-term and sporadic involvement as CAHWs, such as during vaccination campaigns (unpublished data, personal observation).

Several NGOs and FAO have been involved in the selection and training of CAHWs. In the past, OXFAM was greatly involved. Currently, Catholic Relief Services, Welthungerhilfe, Vétérinaires Sans Frontières (VSF)-Belgium, Mercy Corps, Caritas, and Cooperation & Development are collaborating with the MAAIF and Makerere University in training of new CAHWs, refreshing the knowledge of current ones, and supporting CAHWs associations (personal interviews). CAHWs face several barriers when delivering their services. These are related to mobility, as roads are frequently in a bad state during the rainy season, in some cases the bikes that they were provided during training are not functional anymore, and the walking distances are taxing (Akello et al., 2013; Waiswa, 2016). This, compounded by the lack of telecommunication, has created difficulty in communicating with the livestock keepers, as some of them are difficult to reach, which has kindled distrust. Further, it has also been evidenced that some livestock keepers distrust CAHWs because they see them as selling drugs that they have been provided for free by the government or NGOs

(Aklilu, 2016). At the same time, some CAHWs lack motivation. This is related to the lack of economic sustainability throughout the year of working as a CAHW (sustainability is mainly achievable during the rainy season). They also have poor communication with and supervision by the DVOs. Further, their low motivation is also related to a mismatch between their literacy level and the content and delivery mode of the trainings, especially if these have a small practical component, coupled with few continuing and refresher trainings. CAHWs also face difficulties in acquiring and maintaining equipment and supplies (Akello et al., 2013). Given the lack of salary, many CAHWs end up treating only their own animals or animals that belong to their friends or family, while they wait to participate in vaccination campaigns (Waiswa, 2016).

For veterinary shops to be allowed to sell medicines, they need to be registered through the MAAIF and NAD. One of the requirements for this is to the presence of technical staff, such as a paravet or a veterinarian, working and/or supervising the shop. To sell vaccines, further requirements related to cold chain must be fulfilled. Therefore, CAHW-managed shops face a challenge in this regard as well.

Ilukor et al.'s studies (2012, 2015), identified that the role of female household members and herdsmen is limited to the identification of diseases, and, along with middlemen that sell drugs and drug shops, they are considered the least influential actors in the chain. Moreover, primary decision-making to vaccinate or not to vaccinate rests with men, depriving women of direct involvement in requesting vaccination services. This is also exacerbated but the number of livestock women have to handle during vaccination campaigns putting themselves at disadvantage with men, especially if large number or large livestock is involved.

Conclusions

PPR vaccines are provided free of charge by the government in the Karamoja sub-region. Nonetheless, these are delivered only during and after outbreaks in an apparent ad hoc manner and in small quantities. Further, the government lacks financial capacities, and possibly, political will, for an appropriate delivery of the vaccines, and highly depends on external funding for the acquisition and distribution of vaccines. The major challenge for the government in providing vaccines in adequate quantities and within an appropriate disease prevention and control scheme, is financial, exacerbated further with understaffed and ill-equipped vaccination services at the local level, and poor infrastructure. The private veterinary sector is weak and underdeveloped in the region; therefore, no other actors (except the international donor and NGO communities) can provide an alternative for improving access to vaccines. Hence, both women and men livestock keepers face challenges in accessing vaccines. It is important to recognize that this access is somewhat differentiated, where men have comparative advantage enforced by social norms and practices. Women have little control over livestock management, especially in kraals, and, overall, little to no control of household finances and decision making. CAHWs are available at the local level but have limited economic incentives to provide services outside of vaccination campaigns and inadequate technical competency, thus, leading to distrust among community members and underutilization of resources invested in training and organizing CAHWs into formal groups (i.e., CAHW associations).

Reference List

- Abebe, D. (2016). Veterinary Services in Karamoja, Uganda: A Review. Retrieved from <https://www.karamojaresilience.org/publications/item/veterinary-services-in-karamoja-uganda-a-review>.
- Acosta, D. (2019). Supply Chain Analysis for a thermostable PPR vaccine in Karamoja, Uganda. University of Florida.
- Akello, R., Aduto, J., & Nareebah, G. (2013). Animal Health Sector Assessment Report (Abim, Kaabong and Kotido).
- Aklilu, Y. (2016). Livestock in Karamoja : A Review of Recent Literature. Karamoja Resilience Support Unit (KRSU), Uganda, 40.
- Ayele, M., & Catley, A. (2019). Livestock, Wealth and Poverty in Karamoja. In Karamoja Resilience Support Unit (KRSU), Moroto (pp. 1–12).
- Bugeza, J., Kankya, C., Muleme, J., Akandinda, A., Sserugga, J., Nantima, N., ... Odoch, T. (2017). Participatory evaluation of delivery of animal health care services by community animal health workers in Karamoja region of Uganda. PLOS ONE, 12(6), e0179110. <https://doi.org/10.1371/journal.pone.0179110>
- Central Intelligence Agency (CIA). (2018). Africa : Uganda — The World Factbook. Retrieved May 10, 2019, from <https://www.cia.gov/library/publications/the-world-factbook/geos/ug.html>
- Coffin-Schmitt, J. (2018). Report on Site Assessment of Karamoja. Feed the Future Innovation Lab for Livestock Systems.
- Crawford, S., & Kasiko, M. (2016). Support for Strategic Review and Planning to Strengthen DfID's Work on Gender Equality and Women and Girls Empowerment in Karamoja Region, Uganda. Retrieved from <http://marketingdatabase.tat.or.th/download/article/research/1201finalreport.pdf>
- Dione, M., Steinaa, L., Okoth, E., Roesel, K., & Wieland, B. (2016). Pig diseases in Uganda: Impacts on pig production, human health and nutrition. Retrieved from file:///C:/Users/omunoz/Google Drive/summer project Renata Serra and Sarah McKune/LF_brief24.pdf
- Dyer, N., Omondi, S., & Wantsusi, M. (2008). Securing Pastoralism in East and West Africa: Protecting and Promoting Livestock Mobility. Retrieved from <https://pubs.iied.org/pdfs/G03036.pdf>
- Famine Early Warning Systems Network (FEWS NET). (2016). Karamoja, Uganda: Enhanced Market Analysis 2016. Retrieved from https://fews.net/sites/default/files/documents/reports/Uganda_EMA_20161221_submitted.pdf
- Farm Africa. (2019). Livestock for livelihoods. Retrieved August 23, 2019, from <https://www.farmafrica.org/us/where-we-work/livestock-for-livelihoods>
- Feed the Future Innovation Lab for Livestock Systems. (2019). Peste des Petits Ruminants - Vaccine Associate Award.
- Food and Agriculture Organization of the United Nations. (2017). Gender and adaptation planning in the agricultural sectors: the case of Uganda Integrating Agriculture in National Adaptation Plans (NAP-Ag) Programme. Retrieved from www.fao.org/in-action/naps

- Food and Agriculture Organization of the United Nations. (2018a). Country Gender Assessment Series National gender profile of agriculture and rural livelihoods, Uganda. Retrieved from <http://www.fao.org/3/i8436en/I8436EN.pdf>
- Food and Agriculture Organization of the United Nations. (2018b). Livestock production systems spotlight Livestock Production Systems Spotlight Beef and Chicken Meat. Retrieved from <http://www.fao.org/ag/againfo/programmes/en/ASL2050.html>
- Food and Agriculture Organization of the United Nations. (2013). Community based service improves livestock health in Karamoja. Retrieved from <http://www.fao.org/emergencies/resources/documents/resources-detail/en/c/208052/>
- Food and Agriculture Organization of the United Nations and World Organisation for Animal Health. (2015). Global Strategy for the Control and Eradication of PPR. Retrieved from <http://www.fao.org/3/a-i4460e.pdf>.
- International Development Research Centre. (2019). Peste des Petits Ruminants (PPR). Disease Monograph Series - 02.
- Ilukor, J., Birner, R., Rwamigisa, B. ., & Nantima, N. (2012). Analysis of Veterinary Service Delivery in Uganda: An Application of the Process Net-Map Tool. In Tropentag 2012 conference: Resilience of agricultural systems against crises (pp. 1–24). Gottingen.
- Ilukor, J., Birner, R., Rwamigisa, P. B., & Nantima, N. (2015). The Provision of Veterinary Services: Who Are the Influential Actors and What Are the Governance Challenges? a Case Study of Uganda. *Experimental Agriculture*, 51(3), 408–434. <https://doi.org/10.1017/s0014479714000398>.
- Longoli, S. P. (n.d.). About Karamoja | Karamoja Development Forum. Retrieved August 21, 2019, from <https://karamojadf.wordpress.com/about-karamoja/>
- Mariner, J. C., Gachanja, J., Tindih, S. H., & Toye, P. (2017). A thermostable presentation of the live, attenuated peste des petits ruminants vaccine in use in Africa and Asia. *Vaccine*, 35(30), 3773–3779. <https://doi.org/10.1016/j.vaccine.2017.05.040>
- Mercy Corps. (2018). The Karamoja Livestock Development Master Plan, 2018-2040.
- Ministry of Agriculture Animal Industry and Fisheries. (2010). Agriculture Sector Development Strategy and Investment Plan: 2010/11-2014-15. Retrieved from [https://extranet.who.int/nutrition/gina/sites/default/files/UGA 2010 Agriculture Sector Development Strategy and Investment Plan.pdf](https://extranet.who.int/nutrition/gina/sites/default/files/UGA%202010%20Agriculture%20Sector%20Development%20Strategy%20and%20Investment%20Plan.pdf)
- Ministry of Agriculture Animal Industry and Fisheries. (2019a). Agriculture Sector Strategic Plan (ASSP) – Ministry of Agriculture Animal Industry and Fisheries. Retrieved May 10, 2019, from <http://agricultureug.org/agriculture-sector-strategic-plan-assp/>
- Ministry of Agriculture Animal Industry and Fisheries. (2019b). Ministry of Agriculture, Animal Industry and Fisheries. Retrieved May 15, 2019, from <http://agricultureug.org/>
- Ministry of Agriculture Animal Industry and Fisheries. (2019c). National Development plan (NDP2) – Ministry of Agriculture, Animal Industry and Fisheries. Retrieved May 10, 2019, from <http://agricultureug.org/national-development-plan-ndp2/>
- Ministry of Gender, L. and S. D. (2019). Uganda Women Entrepreneurship Programme. Retrieved August 23, 2019, from <http://uwep.mglsd.go.ug/>

- Muhereza, F. E. (2019). Changing Livelihoods in Pastoralist Areas.
- Mulindwa, B., Ruhweza, S. P., Ayebazibwe, C., Mwiine, F. N., Muhanguzi, D., & Olaho-Mukani, W. (2011). Peste des Petits Ruminants serological survey in Karamoja sub region of Uganda by competitive ELISA. *Veterinary World*, 4(4), 149–152. Retrieved from <http://www.clive.ed.ac.uk/>
- Nanyonga, D. (2018). Us Government Invests \$75 Million To Improve Food And Nutrition Security In Karamoja | Press Release | Uganda | U.S. Agency for International Development. Retrieved August 23, 2019, from <https://www.usaid.gov/uganda/press-releases/04-10-2018-us-government-invests-75-million-improve-food-and-nutrition>
- Nkamwesiga, J., Coffin-Schmitt, J., Ochwo, S., Mwiine, F. N., Palopoli, A., Ndekezi, C., ... Mariner, J. C. (2019). Identification of Peste des Petits Ruminants Transmission Hotspots in the Karamoja Subregion of Uganda for Targeting of Eradication Interventions. *Frontiers in Veterinary Science*, 6, 221. <https://doi.org/10.3389/fvets.2019.00221>
- Obin, G. (2019). Assessing Strategies for Improving Rangeland Utilization In Karamoja: Integrating The Pastoralists' Perspectives. Gulu University.
- Organisation for Economic Co-operation and Development. (2019). Uganda. Retrieved from <https://www.genderindex.org/wp-content/uploads/files/datasheets/2019/UG.pdf>
- Rugira Kugonza, D., Nabasirye, M., Hanotte, O., Mpairwe, D., & Mwai Okeyo, A. (2012). Pastoralists' indigenous selection criteria and other breeding practices of the long-horned Ankole cattle in Uganda. *Trop Anim Health Prod*, 44, 557–565. <https://doi.org/10.1007/s11250-011-9935-9>
- Semakula, J., Mutetikka, D., Kugonza, D. R., & Mpairwe, D. (2010). Comparison of Breeding Systems by Smallholder Goat Keepers in the Humid, Sub-Humid and Semi Arid Ecological Zones of Uganda. *Agricultural Journal*, 5(2), 89–97. <https://doi.org/10.3923/aj.2010.89.97>
- Ssali, S. (2019). A matrix and analysis of gender equality laws and policies in Uganda. Retrieved from <https://www.dgf.ug/sites/default/files/resrcr/A-Matrix-and-Analysis-of-the-Gender-Equality-Laws-and-Policies-in-Uganda.pdf>
- Ssenkaaba, J. (2015). The Changing Livelihood of the Karamojong People of North-Eastern Uganda and its impact on the Survival of their Traditional Gender Roles. The Arctic University of Norway. Retrieved from <https://munin.uit.no/bitstream/handle/10037/7782/thesis.pdf?sequence=2&isAllowed=y>
- Stites, E. (2019). Gender in light of livelihood trends in the Karamoja Cluster. In Karamoja Resilience Support Unit (KRSU), Moroto (pp. 1–5).
- The Intergovernmental Authority on Development. (2015). Resilience Context Analysis. Resilience to food insecurity and malnutrition in Karamoja, Uganda.
- The Intergovernmental Authority on Development Center for Pastoral Areas & Livestock Development. (2013). The Contribution of Livestock to the Ugandan Economy. Retrieved from [https://igad.int/attachments/714_The Contribution of Livestock to the Ugandan Economy.pdf](https://igad.int/attachments/714_The%20Contribution%20of%20Livestock%20to%20the%20Ugandan%20Economy.pdf)
- The World Bank. (2018). Uganda Overview. Retrieved May 9, 2019, from <http://www.worldbank.org/en/country/uganda/overview>
- The World Bank. (2019). Third Northern Uganda Social Action Fund (NUSAF 3) | The World Bank. Retrieved August 23, 2019, from <http://projects.worldbank.org/P149965?lang=en>

- U.S. Agency for International Development. (2017). Climate Risk Screening for Food Security, Karamoja Region, Uganda. Retrieved from https://www.usaid.gov/sites/default/files/documents/1866/170130_Karamoja_Food_Security_Climate_Screening.pdf
- U.S. Agency for International Development. (2019). History | Uganda | U.S. Agency for International Development. Retrieved May 10, 2019, from <https://www.usaid.gov/uganda/history>
- Uganda Bureau of Statistics. (2009). Livestock Sector Profile. Retrieved from http://www.ugandainvest.go.ug/uia/images/Download_Center/SECTOR_PROFILE/Livestock_Sector_Profile.pdf
- Uganda Bureau of Statistics. (2016). The National Population and Housing Census 2014- Main Report. Retrieved from www.ubos.org.
- Uganda Bureau of Statistics. (2017). Uganda National Household Survey 2016/2017. Uganda National Household Survey, (September), 355.
- United Nations Development Programme. (2018). Human Development Reports. Retrieved May 10, 2019, from <http://hdr.undp.org/en/countries/profiles/UGA>
- Waiswa, C. (2016). Improving Animal Health and Livestock Production to achieve Food Security in Karamoja.
- Wamani, H. (2014). Food Security and Nutrition Assessment in Karamoja Sub-Region ii. Retrieved from https://documents.wfp.org/stellent/groups/public/documents/ena/wfp274165.pdf?_ga=1.154703096.1171403768.1460369463 World
- Wambi, M. (2016). Uganda Imports New Sheep and Goat Plague Vaccines :: Uganda Radio Network. URN. Retrieved from <https://ugandaradionetwork.com/story/uganda-imports-new-sheep-and-goat-plague-vaccines>
- Williamson, J. (2016). Livestock activity gender impact assessment resiliency through wealth agriculture and nutrition (RWANU), (December), 1–34. Retrieved from <http://www.acdivoca.org/wp-content/uploads/2017/08/RWANU-Livestock-Activity-Gender-Assessment-Report.pdf>.

Annex 1: Organizations and projects participating in the small ruminants-PPR VVC in Uganda

Organization	Purpose	Type of organization	Contact information (name, title, phone and email)*
Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)	Responsible for importing and distributing PPR vaccine	Central Government	Hono. Vincent Bamulangaki Ssempijja, Minister
MAAIF Directorate of Animal Resources	The Department of Animal Health sits within this Directorate	Central Government	Juliet Sentumbwe, Director, juliesenty@gmail.com
Department of Animal Health, MAAIF Animal Resources	Divisions: Animal Disease Control; Veterinary Diagnostics and Epidemiology; Veterinary Regulation and Enforcement The Commissioner of this Department manages communications with DVOs and distributes vaccine	Central Government	
MAAIF Agricultural Extension Services	Responsible to strengthen human and institutional capacity for delivery of agricultural extension services in local governments and the private sector; to promote agribusiness services and agricultural value chain development; to render advisory and technical services through local governments related to crop, animal and fisheries production; to continuously identify emerging areas for public and private sector investments and advise Uganda Investment Authority and the private sector accordingly	Central Government Agency	
National Agricultural Advisory Services	Contributes to the transformation of the agricultural sector through the provision of agricultural inputs, agribusiness and value chain development for improved household food security and incomes	Central Government Agency	
National Agricultural Research Organisation	Apex body for guidance and coordination of all agricultural research activities in the national agricultural research system in Uganda	Central Government Agency	Paul Boma, Research Officer- Animal Production Scientist, NARO Karamoja sub-region, +256 781 558819 bomapauls@gmail.com
MAAIF Storage Facility in Kampala	Responsible to store vaccines	Central Government	
National Livestock Resources Research Institute	Responsible to improve productivity of Uganda's livestock sector through generation, and promotion of efficient, cost-effective and safe technologies and innovations	Central Government Agency	
National Drug Administration	Responsible for registering vaccines, distributors and retailers of veterinary products	Central Government	

National Animal Disease Diagnostics and Epidemiology Centre (NADDEC)	Occasionally involved in the reception and distribution of vaccines	Central Government Agency	
Ministry of Gender Labour and Social Development	In charge of implementing the Gender Equality Policy. Is currently conducting the Uganda Women Entrepreneurship Programme	Central Government	Janat Mukwaya, Minister, +256 772 445557, jmukwaya@parliament.go.ug
Ministry of Finance, Planning and Economic Development	Allocates and plans the budget for the prevention, control, and surveillance of livestock public good diseases, including the acquisition of vaccines	Central Government	
Makerere University College of Veterinary Medicine, Animal Resources and Biosecurity	Implements Feed the Future Innovation Lab for Livestock Systems (LSIL) Peste des Petits Ruminants Vaccine Associate Award in collaboration with the University of Florida, Tufts University and Mercy Corps Development of a standard manual for CAHWs training, along with Caritas, and Catholic Relief Services	Public University	Frank Mwiine, Dean of School of Bio-security, Biotechnical and Laboratory Sciences, +256 787 405 220 / +256 704 689 803, mwiine@covab.mak.ac.ug
	Hearing their voices: Action research to support women's agency and empowerment in livestock vaccine distribution, delivery and use in Rwanda, Uganda and Kenya. (IDRC funded)		Anthony Mugisha, Professor of Veterinary Sciences & Socio-economics and Dean Emeritus, +256772502887+25677250 2887, amugisisha@covab.mak.ac.ug
Office of the Prime Minister: Karamoja Affairs	In charge of running the <i>Karamoja Integrated Development Program</i>	Central Government	
District Community Development Offices	Implement governmental development programs, especially targeting vulnerable population and gender	District government	
FAO Uganda	Priority area 1. Production and productivity of agriculture, forestry and fisheries commodities. Priority area 2. Agricultural knowledge and information. Priority area 3. Resilience to livelihood threats with emphasis on climate change.	Development Agency	Querido Antonio Luis Ferreira, +256 414 340324/5, FAO-UG@fao.org
Pan African Veterinary Vaccine Centre (PANVAC)	Provides international independent quality control service for veterinary vaccines produced in and imported to Africa	International Organization	
Mercy Corps	Implementation of the "Apolou" project Training of CAHWs Subawardee to LSIL's PPR vaccine associate award	NGO	
Veterinaries Sans Frontiers Belgium	Support to CAHWs associations <i>Livestock husbandry groups</i> <i>Livestock marketing associations</i>	NGO	Emmanuel Emaruk, Program Manager, +256 782970592
Farm Africa	Implementation of the "Livestock for Livelihoods" project	NGO	William Obonyo Otoke Program Coordinator, +256

			772468692, williamo@farmafrica.org
Co-operation and Development	Training of CAHWs	NGO	
International Institute of Rural Reconstruction	They do not participate in vaccination, but do work with children and women, especially in education	NGO	Pamela B. Nyamutoka Katooro, Country Director, + 256 414 664 495, +256 754 286331, pamela.nyamutoka@iirr.org
Welthungerhilfe	Cross-border project with Kenya on vaccines and distribution of goats	NGO	Dirk Ullerich, Program Coordinator, dirk.ullerich@welthungerhilfe.de
Caritas	Training of CAHWs Development of a standard manual for CAHWs training, along with Catholic Relief Services, and Makerere University	NGO	Moroto: Thomas Loquang, +256 414 51 03 38, aatomloquang@gmail.com Kotido: +256 772605387, kotidocaritas@gmail.com
Catholic Relief Services	Implementation of the “Nuyok” project Training of CAHWs. Development of a standard manual for CAHWs training, along with Caritas, and Makerere University	NGO	Gratian Ochola, Livelihoods Team Leader, +256 782960426
Samaritan’s Purse International Relief	Distributes goats in Napak District	NGO	
Dodoth Agro Pastoralist Development Organisation	To empower agro-pastoralists in Dodoth to fully take control of own development pursuits, improve animal health, agriculture, livestock production and marketing, livelihood diversification, human rights protection and peace building	Civil Society Organization	Simon Peter Lomoe Lokure, Executive Director, +256 772343367; +256 752343367, simonlomoe@gmail.com
Matheniko Development Forum	Established by the Karamojong civil society groups in response to the many pressing issues affecting the Karamojong such as deepening poverty with declining human development, human rights violations, devastating state of the environment, high rate of illiteracy, and the extreme marginalization by past and current governments	Civil Society Organization	+256 782390985, madefo.org@hotmail.com
Uganda Women’s Network	Working to advance public policy regarding women's rights	Civil Society Organization	
Riamiriam Civil Society Network	Implements projects on women’s empowerment	Civil Society Organization	Richard Omoding, Executive Director, +256 773441129, omodingrichard32@gmail.com
DOCAHWA (Dodoth)- Kaabong	To open and manage vet shop; organize CAHWs work and representation at the government level	CAHWs Association	
JICAHWA (Jie)- Kotido		CAHWs Association	
ACAHWA (Abim)		CAHWs Association	
BCAHWA (Napak)		CAHWs Association	Joyce Loumo, Secretary, +256 772966511

Department for International Development of the United Kingdom	Implementation of the project “Strengthening Resilience and Adaptive Capacity of Agro-Pastoral communities and the Local Government to Reduce Impacts of Climate Risk on Livelihoods in Karamoja, Uganda”	International Development Agency	
Funded by the World Bank and implemented by MAAIF	Implementation of the “Regional Pastoral Livelihoods Resilience Project”, which is building infrastructure and delivering vaccines. Will run until March 2021	Central government	DVOs of each district

**Unfortunately, some contacts were difficult to identify but they were still included to remain coherent with the rest of the report and to be exhaustive.*

Annex 2: Key stakeholders and contacts identified in the small ruminants VVC in Uganda

Name	Title	Contact information (phone, email)	Organization
Christine	Salesperson	+256-0777055958	Bassar (vet-shop in Kampala)
Juliet Sentumbwe	Director	juliesenty@gmail.com.	Animal Resources, MAAIF
Musa Sekamatte	Coordinator	+256-704936089 / +256-77204552 / +256-782863357 musasekamatte@gmail.com ,	National One Health Platform, Ministry of Health
Moses Okino	DVO	+256 773 129994	Department of Production, Moroto District
Josephine Amodoi	Animal Production Officer	+256 774781885	Department of Production, Moroto District
David Ssendagire	DVO	+256 772648831	Nabilatuk District
Akia Goretti	Animal Production Officer	+256 752218086	Department of Production, Nabilatuk District
Mary Goretti Kulume	DVO	+256 772 479948	Department of Production, Napak District
Oscar Burton Okengo	DVO	+256 772996147/ +256 0773016670 dvoabim@gmail.com	Department of Production, Abim District
Kaziro Micheal	DVO	+256 782 529503 dvoamudat@gmail.com	Department of Production, Amudat District
John Logwee	DVO	+256 782291665 dvokaabong@gmail.com	Department of Production, Kaabong District
Henry Mulondo	DVO	+256 782165915 henrymulondo@gmail.com	Department of Production, Kotido District
Ariouga	DVO		
Francis Inangolet	Head	+256 772 582104	Animal Production, Moroto District
Benedicto Aleper	CAHW	+256 781056281	Kosike Parish, Nabilatuk sub-County, Nabilatuk District
Moses Ilukol	CAHW	+256 781929898/+256 752 469494	Kosike Parish, Nabilatuk sub-County, Nabilatuk District
Robert Angella	CAHW	+256 77407083	Acegeretolim Parish, Nabilatuk sub -county, Nabilatuk District
Daniel Loru	CAHW	+256 708744468	Moru-Angibui, Nabilatuk sub -county, Nabilatuk District
Deo Loduk	CAHW	+256 779340675	Acegeretolim Parish, Nabilatuk sub -county, Nabilatuk District
Felix Kodet Damac	CAHW leader (first trained CAHW in the sub-county)	+256 780392279	Acegeretolim Parish, Nabilatuk sub -county, Nabilatuk District
John Bosco Nangiro	CAHW – vet shop manager, owned by the CAHW association, in Nabilatuk Town Council	+256 778249191/+256 784977373	Nakobokobe Parish, Nabilatuk sub -county, Nabilatuk District
Christine Nakut	CAHW	+256 774875580	Nabilatuk sub -county, Nabilatuk District

John Paul Kodet	CAHW (unofficially manages and heads the CAHW association along with Joyce Louimo)	+256 779954938	Namendera Parish, Iriiri sub - county, Napak District
Philip Otyang	CAHW	+256 780723825	Iriiri Parish, Iriiri sub -county, Napak District
Peter Lopuskou Lokuun	CAHW	+256 789997365	Nabwal Parish, Iriiri sub - county, Napak District
Mariko Nengo	CAHW	+256 773893494	Tepeth Parish, Iriiri sub - county, Napak District
Joyce Loumo	CAHW	+256 772966511	Iriiri Parish, Iriiri sub -county, Napak District
Daniel Odyang	Youth Livelihoods Program Manager	+256 772734586, Daniel.odyang@crs.org	Catholic Relief Services
Gratian Ochola	Livelihoods Team Lead	+256 782960426	Catholic Relief Services
William Obonyo Otoke	Program Coordinator (Livestock for Livelihoods)	+256 772468692, williamo@farmafrica.org	Farm Africa, Moroto Office
Dirk Ullerich	Program Coordinator	dirk.ullerich@welthungerhilfe.de	Welthungerhilfe
Emmanuel Obukui	Livestock Officer	emmanuel.obukui@welthungerhilfe.de	Welthungerhilfe
Emmanuel Emaruk	Program Manager	+256 782970592	VSF- Belgium
Michael Adey	Program Associate Africa Program Farmer Field Schools, Livelihoods and Livestock Production	+256 782027815	FAO
Francis Omongin	Lab Technician for the Diagnostic and Vaccines lab	+256 773 719009	MAAIF

Annex 3: Summary findings of gap analysis for increasing women's engagement in and benefit from the LVVC

	Major Gaps in Knowledge	VVC Gaps
MFPEd	Process, actors and drivers of allocation of funding for vaccines and vaccination campaigns; Actors above and below this Ministry that have/could have an influence on vaccine/vaccination decisions	Lack of permanent and adequate funding for vaccines and vaccination campaigns
Node	Main actors involved in the decision making; Policies and budget related to vaccination; Overstepping MAAIF responsibilities or lack of coordination with MAAIF ²	Ratio of government to outside donor funding for vaccines, skewed towards outside funding; Potential feeble sustainability of this funding under the current climate of dwindling funds or donor fatigue
MAAIF	Process of allocation of vaccines to the different districts (whether this is mainly and/or only based on outbreak occurrence); MAAIF's coordination of vaccine delivery and vaccination with district level veterinary services offices; Existence and content of MAAIF's strategy to increase livestock vaccination among women livestock keepers or efforts to integrate women in vaccination campaigns; Existence and content of MAAIF's strategy to increase the number of women who work as DVOs, animal husbandry officers, and/or CAHWs	Difficulties defining what is a public good disease versus a private good disease; Lack of a prevention and organized vaccination program; High dependency on external funding and logistics, especially NGOs; Lack of development of the veterinary private sector in Karamoja and understanding of how to give space to the private sector; Over and understocking of vaccines; Lack of adequate number of technical staff and technical competence
Node	Main actors, process and drivers for storage, distribution, transportation, etc. of vaccines	Inadequate infrastructure and technical capacity: <ul style="list-style-type: none"> • transport • storage • cold chain • trained staff • communications • roads
DVOs	Distribution process (who, how, and how many vaccines); Process and reasons for becoming a DVOs; Barriers that women face to become a DVO; Barriers that women face to work as a DVO; Quality, frequency and methods of communication with livestock keepers and CAHWs; Existence and preference to work with women or men livestock keepers or women or men CAHWs; Barriers, opportunities, and difficulties that they face during vaccination campaigns' mobilization and the vaccination activity	Inadequate infrastructure: <ul style="list-style-type: none"> • transport • storage • cold chain • communication • roads Inadequate technical capacity: <ul style="list-style-type: none"> • trained staff • capacity building (refresher training) • record-keeping
Extension officers (animal husbandry officers)	Process and reasons for becoming an extension officer; Barriers that women face to become an extension officer;	Adequate and timely budget and salaries

	<p>Barriers that women face to work as an extension officer;</p> <p>Number of women extension officers and women to men ratio;</p> <p>Quality, frequency, and methods of communication with CAHWs and livestock keepers;</p> <p>Barriers, opportunities, and difficulties that they face during vaccination campaigns' mobilization and the vaccination activity</p>	
Node	Distribution to and between CAHWs (communication, transport)	
CAHWs	<p>Process of CAHW selection in the different districts, including the differences in the process according to the actors who are involved (government vs. NGOs vs. community);</p> <p>Difference during selection, training and fieldwork between women and men;</p> <p>Difficulties, and opportunities for making their work economically sustainable and potential differences between women and men;</p> <p>Women and men's difficulties, and opportunities for participating in vaccination campaigns;</p> <p>Potential pressure of the livestock keepers to provide vaccines and their response to this demand/pressure (e.g. illegal purchase)</p> <p>Effects of intersectionality (gender, age, education, cultural system, ethnicity) on increasing the number of women CAHWs</p>	<p>Lack of trust between livestock keepers and CAHWs, and between DVOs and CAHWs;</p> <p>Small number of CAHWs, especially women CAHWs;</p> <p>Distrust in the quality of the vaccines;</p> <p>Lack of legal status of CAHWs;</p> <p>High dependency on government and NGOs;</p> <p>Difficulties in running vet shops due to lack of management and business skills and need to have supervision by technical staff to be legally registered. Further, to be able to sell vaccines, need of a cold chain</p> <p>Perception changes among men in kraals to accept women CAHWs</p>
Node	<p>Level, type, actors, and areas of reliance on external input;</p> <p>Feasibility of integrating CAHWs into a viable private sector and for them to work independently</p>	<p>Quality of roads, particularly during the rainy season;</p> <p>Availability and quality of bikes;</p> <p>Long walking distances, with some livestock keepers being in remote areas;</p> <p>Lack of safe transport means (a concern particularly for female CAHWs);</p> <p>Lack of appropriate tools for transporting veterinary products sensitive to the sun and heat, including vaccines;</p> <p>Inadequate means of public transport;</p> <p>Inaccessible villages and kraals;</p> <p>Distrust with livestock owners;</p> <p>Availability of equipment for performing their work, such as gloves, syringes, etc.</p>
Livestock keepers	<p>Attempts and process of illegal purchase of vaccines (similarities and differences with to other drugs);</p> <p>Existence and preference of women vs men CAHWs;</p> <p>Process and actors involved in the decision-making regarding vaccination of livestock, according to the different species;</p> <p>Differences between ethnic/education/socioeconomic groups in the uptake of vaccines or vaccination practices</p>	<p>Lack of knowledge about the purpose of vaccines or disease management;</p> <p>Distrust in the quality and effect of the vaccines;</p> <p>Unwillingness to pay for the work of CAHWs, especially related to vaccination;</p> <p>High dependency on government and NGOs;</p> <p>In the general case of treatment, some delay or default paying CAHWs, preferring to use herbs because they are free;</p> <p>Seasonal migration of livestock making it more difficult to reach animals for vaccination;</p> <p>Triple role of women to take on additional responsibilities</p>

Others (agro-vet shop owners, vet-store owners, other private actors supplying vaccines)	<p>Their roles in the provision of vaccines for different animal species and vaccines and potential differences according to the latter components;</p> <p>Difficulties and advantages for acquiring, and distributing vaccines according to actor, species, vaccines, and district</p>	<p>Barriers or opportunities for women to become agrovets;</p> <p>Requirements for an enabling environment for women to join this node (availability of financial resources, education, legal support)</p>
NGOs and other international actors (FAO, etc.)	<p>Their roles in the entire LVVC of different animal species and vaccines and potential differences according to the latter components;</p> <p>The most important roles they play;</p> <p>Difficulties and advantages for acquiring, and distributing vaccines according to actor, species, vaccines, and district;</p> <p>Programs targeting women livestock keepers and/or CAHWs</p>	<p>Sustainability approaches NGOs use to scale effective strategies and make them sustainable in the LVVC</p>

Annex 4: PPR Vaccine Value Chain in Uganda

